Introduction

Orientation and mobility (O&M) instruction primarily emphasizes three general components: A) a device to provide information, B) systematic strategies for the use of the device and C) and proficiency in the use of the strategies by the traveler. The long cane by itself is just a piece of pipe or fiberglass and will not make a person independently mobile. It is the strategies of using the cane in a systematic fashion that gives it significance. Once the strategies have been taught, through a systematic curriculum of instruction, the individual then develops skill and proficiency in the application of these strategies. Like the long cane, efficient us of the adapted cane or adaptive mobility device (AMD) will require strategies for instruction, and orientation and mobility skills for day-to-day use.

Also, like the long cane, the AMD has evolved and its use has spread from primarily one population to a number of varied populations. Initially, AMDs were most frequently used in the instruction of young children 3 to 5 years of age. At this age, motor skills are developing and movement needs to be encouraged. It is believed that the blind child might not explore their environments without structured opportunities to do so, as well as needing a feeling of safety or protection. Other populations, which have difficulty with motor skills, movement within the environment, and limited success with using the long cane, are the elderly visually impaired and those individuals who are blind or visually impaired of all ages that have multiple disabilities. Some have brain damage, which might effect motor skills as well as cognitive skills. Others have dual sensory impairments, which impacts the channels and the methods of learning. For a time, the field of O&M instruction was limited by its lack of pragmatic knowledge and experience in teaching individuals with multiple disabilities.

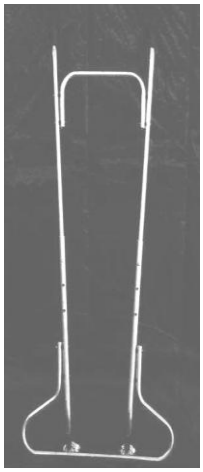
In addition, since people are living longer, the elderly population is growing in number and many have visual impairments. In most countries, the elderly visually impaired are an under-served population. These special populations are challenging O&M specialists to provide innovative, quality O&M services.

There has been some discussion and limited research on the efficiency of using an AMD rather than a traditional long cane with individuals from the above populations. O&M specialists have been constructing such devices and instructing students in their use. Recently university O&M preparation programs have begun including AMDs as part of their curriculum. A competency for students in O&M programs is to demonstrate knowledge and understanding of the different types of long canes, adapted canes, and adaptive mobility devices, and their strengths and limitations as travel tools. The field of O&M has recognized the AMD as a legitimate device for the teaching of orientation and mobility skills.

The Device

This curriculum identifies specific skills such as those used for straight-line travel, for opening doors, ascending and descending stairs, trailing a shoreline, and locating an intersecting sidewalk for use with the Adapted Cane as developed by the Veterans Administration in Decatur Georgia.

This Adapted Cane with modifications is available from Autofold (P.O. Box 1063, 208 Coleman St, Gardner, MA 01440-1063, phone 508-632-0667). This curriculum guide offers a sequence of skill presentation, which will assist the learner to be successful in using the adapted cane in a safe and efficient manner. Teaching strategies associated with the skill acquisition are suggested including techniques, which have been successful with deafblind students. Sample forms for data collection are also included.



A number of benefits of this adapted cane have been identified over PVC type devices, which have previously been described in the literature.

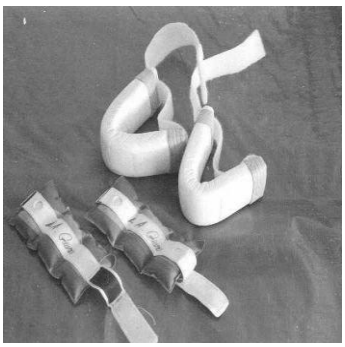
To use this device both hands grasp the cane perpendicular to the front plane of the body rather than parallel as with the PVC devices. This positions the body in an upright shoulders back posture rather than allowing the individual to hunch over somewhat. Placement of the hands to the side of the body rather than in midline offers a more direct spatial correlation between the wheels' movement and the information received by the hands.

For example, if the right wheel goes off the shoreline, the right side of the body feels it most strongly. In addition, the construction of this adapted cane is aluminum tubing that offers the flexibility in sizing the cane to meet the growth needs of students. Finally, parts on the adapted cane can be changed without total reconstruction of the device should one part become broken.

What are the benefits of adapted cane use?

Regardless of age and level of cognitive abilities, movement is important to the well being of our physical conditioning and is mentally stimulating. Therefore, a major goal is to have the student walking from one destination to another and feeling secure with their independent movement.

There are multiple additional benefits of adapted cane use. If a student does not require an orthopedic device but is limited in standing balance and has difficulty walking long distances, an adapted cane might be beneficial. When grasping the adapted cane with both hands, the body is positioned in such a way to provide some support. For others whose nervous system requires greater sensory input, an adapted cane provides stimulation through both hands. Greater sensory input is provided by the heavier weight of the adapted cane.



Attaching ankle weights provides proprioceptive input and is one method of increasing the weight as well as providing a mechanism to keep the cane on the surface. Substituting plastic runners in place of the casters will also provide proprioceptive input and changes the control of the cane by slowing the movement of the cane.

For all students, it is very important to be up and moving. The experience of having a device that protects the width of the body without requiring them to do no more than hold on with both hands can be motivating for independent travel.

The student who is deafblind requires input through their tactual system. With both hands on the adapted cane, tactual information is received from two ground contact points. This increases the amount of information defining the space in front of them.

The relative simplicity of skills involved in using the adapted cane allows students to quickly learn to move safely with some degree of independence. This then allows the opportunity for repetitive practice of simple motor behaviors that are so necessary for learning in individuals with multiple disabilities. In addition, monitoring strategies to reinforce the learning of these skills, are easily passed on to other team members which allows the opportunity for even more practice and consistency.

Readiness Behaviors

In some instances, the decision to introduce an adapted cane has been made on the fact that the student was not successful with the long cane. After more experience, the criteria for selecting an adapted cane, other than failure with the long cane, have been established.

To use the skills in this curriculum basic readiness skills are necessary. Students should be selected through appropriate assessment procedures. In most cases it can be determined that instruction in the use of the adapted cane is appropriate if the student has sufficient balance and endurance to walk distances from one location to another desired location. In most situations, this involves a distance of approximately 10 yards. In situations where the student is emotionally disabled and is also aggressive towards themselves or others, some level of emotional stability must also be achieved prior to instruction in adapted cane use. This should not be confused with behavior that communicates the student's unwillingness to cooperate with an unfamiliar activity. Although, some students might initially demonstrate negative behaviors towards the use of an adapted cane, it is expected that cooperative behavior will be achieved when familiar with the task.

For some individuals, the adapted cane will be the device of choice for a lifetime. For others, an adapted cane may be a stepping stone to instruction in the use of the long cane.

Model of Instruction

The suggested approach is the infused model of Orientation and Mobility instruction; that is, having instruction occur during a functional route within the student's regular schedule, (Gee, Harrell & Rosenberg, 1987) has proven successful with most students with multiple disabilities. Initially, instruction usually begins while completing an indoor route that occurs during the student's normal schedule. Instruction then moves to outdoor routes when and if these occur during the student's normal schedule. The selection of an appropriate route can be a very important component for success.

In addition to choosing routes that are infused into the student's daily activities, instruction and monitoring should also be provided as a team effort. In most instances instruction should be given by individuals who have rapport with the student. Occasionally this may mean only one individual will instruct and monitor the student. For example, the O&M specialist may direct the classroom teacher who then provides the input to the student. Generally, however, the teacher, classroom aides, primary caretakers, and parents are all involved in lessons to learn the techniques to monitor and reinforce the appropriate use of the adapted cane when used beyond the time of direct O&M instruction.

Route Selection

Within an educational program, the classroom teacher would develop a weekly schedule of routes traveled by the student. With the assistance of the O&M specialist, routes would be selected based on the expectation of frequent use of all or part of the route. A route would be selected that is traveled the most frequently and has elements that require the student to use skills at or just slightly above their present level of functioning. The length of the route, or the portion of the route that the student is required to travel independently, may be determined by the student's ability to attend

and tolerate interaction with the instructor. Also, landmarks and environmental conditions such as stairs, curbs, street crossings might impact the selection of such routes. For example, the O&M specialist might select the route from the cafeteria to the classroom for instruction because the student is at the level of learning to locate landmarks to make directional turns. The route would include several opportunities to apply this skill. Staff monitoring of travel on the route will be shared. The O&M specialist will meet the student at the cafeteria at 12:10 p.m. at the conclusion of lunch, three days per week, to provide instruction. The classroom teacher will monitor and reinforce these skills when the student travels this route at other times. As more skills are introduced to the student in the use of the adapted cane, additional routes would be selected.

MONITORING STRATEGIES

In order to provide the most opportunities for practice so often needed by the student with multiple disabilities many individuals will be involved with monitoring the student's travel. It is important for each member of the team providing instruction and monitoring, to be as consistent as possible in the manner they interact with the student.

Team members should provide the absolute minimal verbal/physical cues and allow the student to complete the route as independently as possible. It should not be assumed that the student always needs input. In most instances a system of most to least prompting should be used and data should be collected across team members to remain as consistent in the number and types of prompts as possible.

All team members should agree on and have the student follow the exact same route. Team members may need to direct the student at the point of turns. Team members should not allow the student to continue in a direction that is incorrect for more than a step or two. At this level of instruction, nothing is gained from allowing a student to

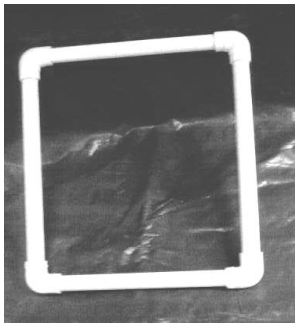
travel in an incorrect direction, yet the student may be able to self-correct within a step or two.

Team members who are monitoring routes should maintain a distance of no greater than 40 yards and always maintain visual contact with the student. For longer or more complex routes, team members may consider using "relay" supervision. In this situation several team members will supervise the student at different points along the route as the student moves along it. This will allow team members to monitor other students while the adapted cane user is travelling independently.

Acquisition And Sequence of Skills

Hand Skill

The ability to grasp and maintain a grasp is a skill that some students will need to be taught. Prior to introducing an adapted cane, the instructor will need to provide the opportunities to develop the ability to maintain a full palmer grasp with both hands. To develop this skill, the student is instructed in the uses of a device referred to as the "come-along". (In the TAPS curriculum (1993) this device is referred to as a Pre-Cane Simulator.)



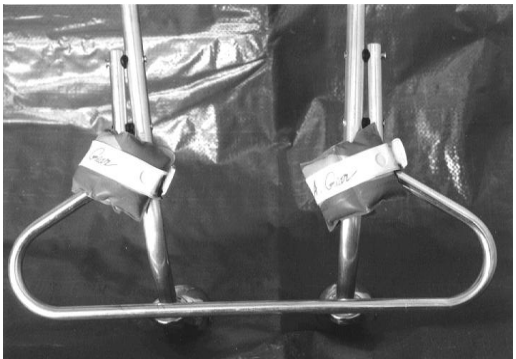
The "come-along" is constructed out of four 10 to 12 inch PVC tubes using four 90 degree joints to form a rectangle. The student's hands are positioned on the PVC with a palmer grasp that is referred to as a grocery cart grasp. In an effort to remove the instructor from physical contact with the student, the instructor holds the opposite side of the "come-along" from the student. Frequent repositioning of the student's hands is usually required until the student has developed sufficient hand strength to maintain a continuous two handed grasp. This activity is done throughout the day when the student must move from one location to another. For example, when the student leaves the classroom to walk to the lunchroom.

When using an adapted cane requiring a bicycle grasp, the hands are positioned in such away to allow the shoulders to be back rather than rounded forward. This provides the opportunity for more erect posture of the shoulders and head. However, this grasp requires greater hand strength than grasping a cylinder tube. Without such hand strength, the student is unable to achieve an adequate grasp of the cane with the effect that the cane will not be maintained in front of the body. Some instructors have suggested that students extend their index finger along the sides of the adapted cane if there is a possibility that the student will eventually move to long cane use. However this step should only be taken once a strong hand grasp is achieved since it requires even greater hand strength to perform this grasp.

When a student demonstrates an extreme lack of hand strength, consultation with an occupational or physical therapist should be considered. There are many activities that will contribute to building hand strength.

Maintaining a grasp

After the student has been allowed to explore the cane, the cane is placed in front of him. While walking, the instructor uses hand-over-hand, from behind or from the side of the student, placing her hands over the hands of the student. Pair this with a verbal cue to maintain both hands on the cane. Tactually defensive students might negatively respond to the hand-over-hand technique. Once the student has the concept of how to hold the cane, the instructor removes her hands. If the student removes one hand from the cane, they can be cued from the elbow to maintain their grasp on the cane. Over time, the student responds to the verbal cue "both hands on the cane".



Maintaining the cane on

the ground

Because of the lightweight of the cane, students may lift the cane up off the ground. Using hand-over-hand techniques or weighting the cane just above the bottom crossbar using ankle weights can control some of this behavior. In addition for students with balance difficulties the weights have been used to help maintain balance. When using the weights, the student receives more proprioceptive input that can provide an additional benefit.

Maintaining the cane in front of the body

Often, the student lacks the skill of walking in a straight line or even to continue walking without some stimulation. A guide cord attached to the middle of the bottom crossbar can be used by the instructor to guide the cane while the student is walking. The instructor initially is positioned in front of the student walking backwards. If the student stops walking, the instructor tugs lightly on the guide cord to stimulate the student to begin walking. Through the guide cord the instructor can determine the direction of the cane and the student learns through the experience how to maintain the cane in front of their body.

Trailing the wall on the right

The cane is constructed to be wider at the bottom than at the top to facilitate the technique of trailing the wall on the right. The instructor stands behind the student using hand-over-hand, having the right side of the bumper bar contact the wall.

With students who are tactually defensive, the instructor can use the guide cord. The instructor can walk backwards in front of the cane with the guide cord attached on the bottom crossbar to the far right keeping the right side of the bumper bar in contact with the wall. This skill is usually the most easily taught since most of the students have been taught to trail the wall with their hand. Sometimes students will want to trail the wall with their right hand and hold onto the cane with only their left. Trailing with both the hand and the cane is usually discouraged since the information coming from the student's hand becomes primary and they disregard the information coming from the cane.

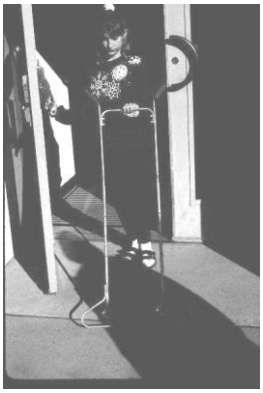
This trailing technique is also used to locate landmarks such as a door or an intersecting hall.

Contacting a door, opening the door, and walking through a

doorway

When the cane contacts the door, the student maintains the bottom of the cane in contact with the door and walks up to the door pushing the adapted cane up against the door.

The student grasps the cane in the middle of the top crossbar with the left hand, and either pushes or pulls the door open with the right hand.



When the door is open, the student extends the cane out in front, pushing the cane as she walks through the doorway. When the door opens to the left side of the student, the student holds the middle of the top crossbar of the cane with their right hand and pushes or pulls the door open with the left hand. At any time the door opens towards

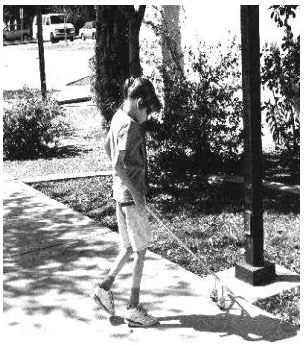
the student, they will need to take a step backwards as they pulls the door open to allow the door to clear the front of the cane. Most students, with practice are able to do this maneuver quite successfully.

When the cane goes off the sidewalk, stopping and returning the cane to the sidewalk

While using the guide cord, have the student freely walk with the cane. The instructor's position should be to one side of the student. When the cane goes off the sidewalk, the instructor verbally tells the student to stop. If the student has not yet learned to respond to the verbally direction to stop, the instructor can pull back on the guide cord or physically stop the student by placing a hand on the student's shoulder. The expected behavior is to have the student stop by responding to the cane dropping off the sidewalk.

Initially, the instructor, through the use of the guide cord, lifts the cane onto the sidewalk and directs the student to walk. Once the student has learned this behavior, it is important that the student

learns not to over correct and alter the line of travel. This can be controlled initially by limiting the return of the cane to the sidewalk by use of the guide cord.

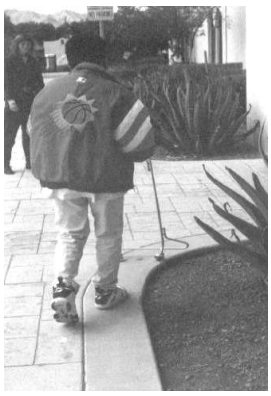


When contacting persons or objects, stopping and pulling the cane towards the body

When the cane contacts an object, the student initially is verbally directed to stop. Through hand-over-hand or using the guide cord, the cane is pulled back towards the student. The student is then instructed to "find the open space" usually searching first to the left and, if not found, then searching to the right. A more difficult skill for the student to understand and learn is correcting the line of travel after going around an object in the path of travel. Re-establishing the line of travel is done with verbal direction or by nature of the environment such as locating and then walking parallel to the wall or the shoreline.

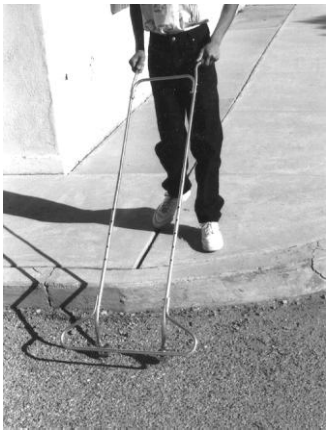
Trailing a shoreline to locate landmarks and maintain line of travel

Position the student parallel to the shoreline, having the cane out in front of them.



With the instructor behind the student, use hand-over-hand technique, on a five count have the student move the cane to the right having the right tip touch the shoreline. One, two, three, four, five, touch the shoreline, return cane to in front of the body. Using this technique helps to establish a rhythm. Over time, the student usually eliminates the verbal counting.

Negotiating curbs



When the cane drops off the sidewalk in front of the student, the student walks up to the edge of the curb. Without moving the bottom of the cane, the student pulls the top of the cane toward the body. The student then pushes the entire cane forward and steps off the curb.

When the cane hits the up-curb the student walks up to the curb without moving the bottom of the cane, then lifts the cane up onto the sidewalk, pushing the cane out in front of his body as he steps up onto the sidewalk.

Negotiating steps

When traveling up stairs, the student positions the cane parallel to the body and lifts up about one inch from the ground. The ground contact points of the cane should contact each step as the student

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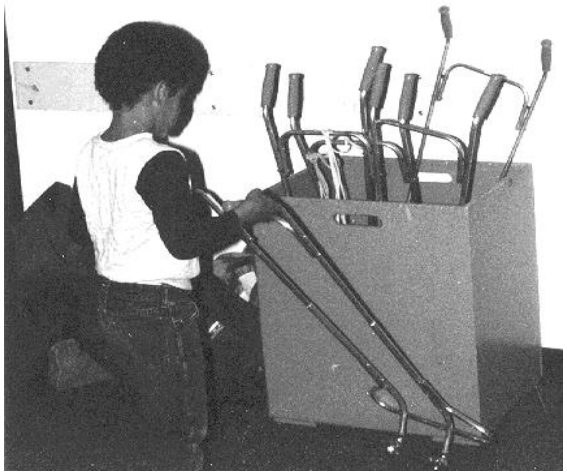
moves forward. Or, when using the handrail, have the student carry the cane with the top cross bar on their shoulder.

When traveling down stairs, the cane should be held at an angle from the body with the ground contact points on the next lower stair. The motion of the student's body as they move should keep the cane moving. When the bottom of the stairs is reached the cane's ground contact points will contact the floor first.

Management of cane when not being used



When reaching the destination, the student should place the cane in the designated area. This may often be just inside and beside the entry doorway. Within some areas such as the cafeteria and other highly traveled areas cane boxes (2ft. x2ft. x3ft.) may be made as a secure place to position the cane.

When the student is using a sighted guide, the student should carry the cane by resting the top parallel bar on their shoulder keeping the cane (from top to bottom) parallel with their body. One hand should hold on to the cane.

Following Verbal Or Physical Directions

Although the student may not initially comply, students should eventually learn to consistently respond to a number of simple directions. These directions should be verbal when possible but with some students may need to be physical, such as a slight touch on the arm indicating the direction of a turn.

Students should initially be taught to respond to a "stop" command. Other increasingly difficult directions include, "walk towards my voice", "turn", and “turn the other way".

Orientation skills

Orientation skills may not necessarily be demonstrated frequently by student with multiple disabilities. However, with repetition, students can learn orientation skills to help them become more independent.

When beginning instruction, the student may need to be physically assisted to turn and to make an accurate turn. Again, team members should be alert for indications that this assistance is no longer necessary and allow the student to independently execute accurate turns.

Initially the student may respond to the tug on the guide cord as an indication that it is time to turn, eventually he may respond to environmental or distance clues to identify this time for himself. The team should look for indications that the student has identified the correct time to turn and phase out all input as this occurs.

With longer routes students may learn to use landmarks along the route to confirm their location. Initially these may be pointed out to the student but eventually this support should be gradually discontinued.

As a student begins to internalize a route he may be able to determine when or if he has gone beyond a landmark which marks a change in direction. When this occurs initially it should be pointed out to the student and he should be instructed or guided to return to the landmark and continue in the correct direction. Support should be faded as possible.

Orientation and Mobility Lesson
Data Form

Student's Name _____ Instructor _____

GOAL: To travel regularly scheduled routes with the maximum level of independence.

OBJECTIVE: When using an adapted cane, the student will travel a frequently traveled route with minimal verbal assistance from staff.

ENVIRONNMENT/ROUTE:

	CRITERIA													
SKILLS DATE														
Maintains grasp of cane														
Maintains cane in front of body														
Maintains cane on ground														
Returns cane to sidewalk before foot goes off sidewalk														
When contacting persons or objects, stops and pulls cane towards self														
Trails wall on right with right tip or wheel of cane														
When reaching destination, parks cane in designated area														
Responds to Directions Stop (V - verbal or P- physical)														
Walk toward my voice (V or P)														
Turn (V or P)														
Turn the other way (V or P)														
Orientation Skills Knows when to turn														
Turns correctly														
Uses landmarks to verify location														
Returns to landmark if passed														

Resources

Although not cited at every opportunity, the authors have relied on input from the following sources.

Farmer, L. and Smith, D. (1997), Adaptive Technology. In Blasch, B., Wiener, W., and Walsh, R. (Eds), *Foundations of Orientation and Mobility, Second Edition* (pp. 231-259) New York: American Foundation for the Blind.

Foy, C., Von Schneden, M., & Walculonis, J. (1992). The Connecticut precane: Case study and curriculum. *Journal of Visual Impairment & Blindness*, 86, 178-181.

Gee, K., Harrell, R. & Rosenberg, R. (1987). Teaching orientation and mobility skills within and across natural opportunities for travel. In L. Goetz, D. Guess & K. Stremel-Campbell (Eds.), *Innovative Program Design for Individuals with Dual Sensory Impairments*, 127-157. Baltimore: Paul H. Brookes Publishing Co.

Pogrund, R., Healy, G., Jones, K., Levack, N. Martin-Curry, S., Martinez, C., Marz, J., Roberson-Smith, B. & Vrba, A. (1993). *TAPS An Orientation & Mobility Curriculum for Students with Visual Impairments.* Austin: Texas School for the Blind and Visually Impaired.

Mancil, R., Manuel, S., Siffermann, E. and Blasch, B. (1996), A study to develop an alternative cane for mobility. In Tellevik, J. and Haugum, G. (Eds), Conference Proceedings International Mobility Conference No. 8, Vol. 2 (pp. 305-307). Norway: Tambartun National Resource Center.

Mancil, R., Manuel, S., Siffermann, E. and Blasch, B. (in press). Results of a study to develop an alternative cane. *RE:view.*

Siffermann, E. and Blasch, B. (1996), A curriculum guide for teaching the adaptive cane. In Tellevik, J. and Haugum, G. (Eds), Conference Proceedings International Mobility Conference No. 8, Vol. 2 (pp. 433-435). Norway: Tambartun National Resource Center.